

CLAIMS:

1. A metallurgical vessel comprising:
an outer shell; and
a plurality of cooling panels attached to the
5 shell to form an interior lining therefor for at least an
upper part of the vessel, each panel having internal
passages for flow of coolant therethrough;
wherein each panel is provided with a plurality
of projections projecting laterally of that panel and
10 extended through openings in the outer shell of the vessel
and connected to the shell exteriorly of the shell in
connections which seal the openings.
2. A vessel as claimed in claim 1, wherein the shell
15 is provided with tubular protrusions surrounding said
openings and protruding outwardly from the shell and said
connections connect said projections to outer ends of the
tubular protrusions.
- 20 3. A vessel as claimed in claim 2, wherein said
projections and protrusions are rigid and in use support
the load of the panel.
- 25 4. A vessel as claimed in claim 2 or claim 3,
wherein said connections comprise a plate members having
apertures and wherein the projections locate within the
apertures and are welded to the aperture and the plate
members are welded to the protrusions.
- 30 5. A vessel as claimed in any one of the preceding
claims, wherein the cooling panels are lined interiorly of
the vessel with refractory material to form an interior
refractory lining for the vessel, the cooling panels being
operable by flow of coolant through said passages to cool
35 the refractory material.

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6. A vessel as claimed in any one of the preceding claims, wherein said projections are of elongate formation and project laterally of the panel in mutually parallel relationship to one another.

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7. A vessel as claimed in any one of the preceding claims, wherein said projections include a series of pins.

8. A vessel as claimed in claim 7, wherein said
10 projections further comprise tubular coolant inlet and outlet connectors for the panel.

9. A vessel as claimed in any one of the preceding claims, wherein the vessel shell includes a generally
15 cylindrical section lined with a series of said cooling panels.

10. A vessel as claimed in claim 9, wherein the panels of said series are of elongate arcuate formation
20 with a curvature to match the curvature of the generally cylindrical section of the vessel.

11. A vessel as claimed in claim 10, wherein the panels of said series having greater length than height.

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12. A vessel as claimed in claim 10 or 11, wherein the projections project laterally outwardly in parallel relationship with one another and so as to be parallel with a central plane extending laterally of the panel and
30 radially of the panel curvature.

13. A vessel as claimed in any one of claims 9 to 12, wherein the panels of said series are disposed in vertically spaced tiers of panels spaced circumferentially
35 of the vessel.

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14. A vessel as claimed in claim 13, wherein the panels are closely spaced but with gaps between the circumferentially spaced panels sufficient to permit removal of each panel by bodily movement thereof.

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15. A vessel as claimed in claim 14, wherein there are at least six circumferentially spaced panels in each tier.

10 16. A vessel as claimed in any one of the preceding claims, wherein the panels are comprised of coolant flow tubes shaped to zigzag formations to form the panels.

15 17. A vessel as claimed in claim 16, wherein the projections are comprised of pins attached to the zigzag tube formations and tubular coolant and inlet and outlet connectors extending from ends of the zigzag tubular formations.

20 18. A vessel as claimed in claim 16 or claim 17, wherein at least a portion of the panels have inner and outer zigzag formations forming inner and outer panel sections relative to the vessel shell.

25 19. A vessel as claimed in claim 18, wherein the arcuate length of the outer panel section is less than the arcuate length of the inner panel section thereby allowing a gap between vertical edges of adjacent panels to be minimised.

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20. A vessel as claimed in claim 18 or 19, wherein said inner panel section and said outer panel section are vertically off-set such that one or more horizontal pipe segments of one panel section are located intermediate
35 horizontal pipe segments of the other panel section.

21. A vessel as claimed in any one of the preceding claims and further comprising a refractory lined hearth, a barrel section disposed above the refractory lined hearth and an off-gas chamber disposed above the barrel section.

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22. A vessel as claimed in claim 21, wherein a portion of the barrel section is lined with double layer panels and the off-gas chamber is lined with single layer panels.

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23. A vessel as claimed in claim 22, wherein only a lowest row of panels in said barrel section comprise single layer panels.

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24. A vessel as claimed in any one of the preceding claims, wherein said vessel locates a plurality of solids injection lances each extending through one of a plurality of apertures in the outer shell into an interior region of the vessel and said plurality of cooling panels providing a plurality of apertures corresponding to said apertures in the outer shell whereby said lances extend through said panels into said interior of said vessel.

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25. A vessel as claimed in claim 24, wherein at least one said aperture is provided by a recess located on an edge of at least one panel.

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26. A vessel as claimed in claim 25, wherein said at least one aperture is provided by alignment of at least two recesses located along edges or at corners of two or more panels.

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27. A vessel as claimed in any one of claims 24 to 26, wherein the lances are located at a common height on the vessel shell at least some of the panels located at said height of said lances have a length corresponding substantially to the arcuate distance between the lances.

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28. A cooling panel for mounting on an outer shell of a metallurgical vessel so as to form part of an internal lining of that shell, comprising:

5 a panel body having an internal passage means for flow of coolant therethrough, and

a plurality of projections projecting laterally of the panel to one side of the panel body and capable of supporting the panel when extended through openings in the
10 shell and connected to the shell exteriorly of the vessel.

29. A cooling panel as claimed in claim 28, wherein the panel body comprises a coolant flow tube shaped to a zig-zag formation.

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30. A cooling panel as claimed in claim 29, wherein the panel body is formed of a single coolant tube shaped to form adjacent inner and outer panel sections of zig-zag formation and said projections project laterally outwardly
20 from the outer panel section.

31. A cooling panel as claimed in claim 30, wherein said inner panel section and said outer panel section are vertically off-set such that one or more horizontal pipe
25 segments of one panel section are located intermediate horizontal pipe segments of the other panel section.

32. A cooling panel as claimed in any one of claims 17 or 18 wherein the length of the outer panel section is
30 less than the length of the inner panel section thereby in use allowing a gap between vertical edges of adjacent panels to be minimised.

33. A cooling panel as claimed in any one of
35 claims 30 to 32, wherein the panel is of elongate arcuate formation and the outer panel section is disposed on the outer side of the panel curve with the projections

projecting laterally outwardly in parallel relationship with one another and so as to be parallel with a central plane extending laterally of the panel and radially of the panel curvature.

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34. A cooling panel as claimed in any one of 30 to 33 wherein said panel is of elongate arcuate formation having greater length than height.

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35. A cooling panel as claimed in any one of claims 30 to 34, wherein the projections comprise a series of pins and tubular coolant inlet and outlet connectors extending from ends of the coolant flow tube.

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36. A cooling panel as claimed in claim 35, wherein the tubular coolant connectors are disposed at one end of the panel and the pins are spaced across the panel between its ends.

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37. A cooling panel as claimed in claim 35 or claim 36, wherein the pins are connected to the panel by means of connector straps each fastened at its ends to adjacent tube segments of the inner panel section and extending between its ends outwardly across a tube segment of the outer panel section.

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38. A cooling panel as claimed in claim 37, wherein the connector straps are generally V-shaped with the root of the V-shape curved to fit about the respective tube segment of the outer panel section.

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39. A cooling panel as claimed in claim 37, wherein the pins are welded to the connector straps so as to extend outwardly from the roots of the V-shapes.

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40. A method of mounting a cooling panel on an outer shell of a metallurgical vessel so as to form part of an internal lining of that shell, comprising:

- 5 providing the cooling panel with a plurality of projections projecting laterally from the panel,
extending the projections through openings in the shell to bring the panel into a position in which it lines part of the interior of the shell,
10 forming connections between the projections and the shell exteriorly of the shell which connections seal the openings.

41. A method as claimed in claim 40, wherein the shell is provided with tubular protrusions surrounding
15 said openings and protruding outwardly from the shell and said connections are formed between the projections and the outer ends of the tubular protrusions.

42. A method as claimed in claim 40 or claim 41,
20 wherein the cooling panel is as claimed in any one of claims 28 to 39.